



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4**


Science and Ecosystem Support Division
Enforcement and Investigations Branch
980 College Station Road
Athens, Georgia 30605-2720


September 17, 2010

4SESD-EIB

MEMORANDUM:

SUBJECT: Final Report (Tronox, Incorporated)
Columbus, Mississippi
SESD Project No. 10-0409

FROM: Art Masters 
Enforcement Section

THRU: Laura Ackerman, Chief 
Enforcement Section

TO: Russ Mclean
Corrective Action Section
RCRA Division

Attached is the Sampling Investigation Report for the investigation conducted in the neighborhood surrounding the Tronox facility in Columbus, Mississippi during the week of April 26th, 2010. If you have any questions or comments, please contact me by phone at (706) 355-8612 or by email at masters.arthur@epa.gov.

Attachment

**United States Environmental Protection Agency
Region 4**

Science and Ecosystem Support Division
980 College Station Road
Athens, Georgia 30605-2720



**Sampling Investigation Report
Tronox, Inc.**

SESD Project Identification Number: 10-0409

**Conducted near
2300 14th Avenue N.
Columbus, MS 39701-2516
Final Report Issued September 17, 2010**

Requestor: Russ McLean
Corrective Action Section
RCRA Division
61 Forsyth St. SW
Atlanta, Georgia 30303-8960

SESD Project Leader: Art Masters
Enforcement Section
980 College Station Road
Athens, Georgia 30605-2720

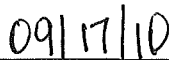
Title and Approval Sheet

Title: Tronox, Inc Sampling Investigation Final Report
Columbus, MS

Approving Official:



Laura Ackerman, Chief
Enforcement Section
Enforcement Investigations Branch

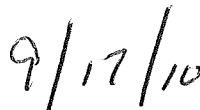


Date

SESD Project Leader:



Art Masters, Environmental Scientist
Enforcement Section
Enforcement Investigations Branch



Date

SAMPLING INVESTIGATION REPORT
TRONOX, INC.
SESD PROJECT NO. 10-0409
SEPTEMBER 13, 2010

BACKGROUND

U. S. Environmental Protection Agency (US-EPA), Region 4, Science and Ecosystem Support Division (SESD) personnel conducted a sampling investigation on April 27th and 28th, 2010 in the neighborhood surrounding the former Tronox, Inc. facility located at 2300 14th Avenue N. in Columbus, Mississippi. This investigation was conducted at the request of the Corrective Action Section, RCRA Division.

Tronox, Inc. (formerly Kerr-McGee) operated as a wood preserving facility which used both creosote and pentachlorophenol formulations to pressure treat lumber products. Table 1 describes the sampling locations. The sample locations are displayed in Figure 1.

The following personnel participated in the sampling investigation:

<u>PERSONNEL</u>	<u>ORGANIZATION</u>	<u>RESPONSIBILITY</u>
Art Masters	SESD	Project Leader/ Sampling
Kevin Simmons	SESD	Sampling/Sample Custodian
Mike Neill	SESD	Safety Officer/Sampling
Sharon Matthews	SESD	Sampling
Russ McLean	RCRA	Project Management

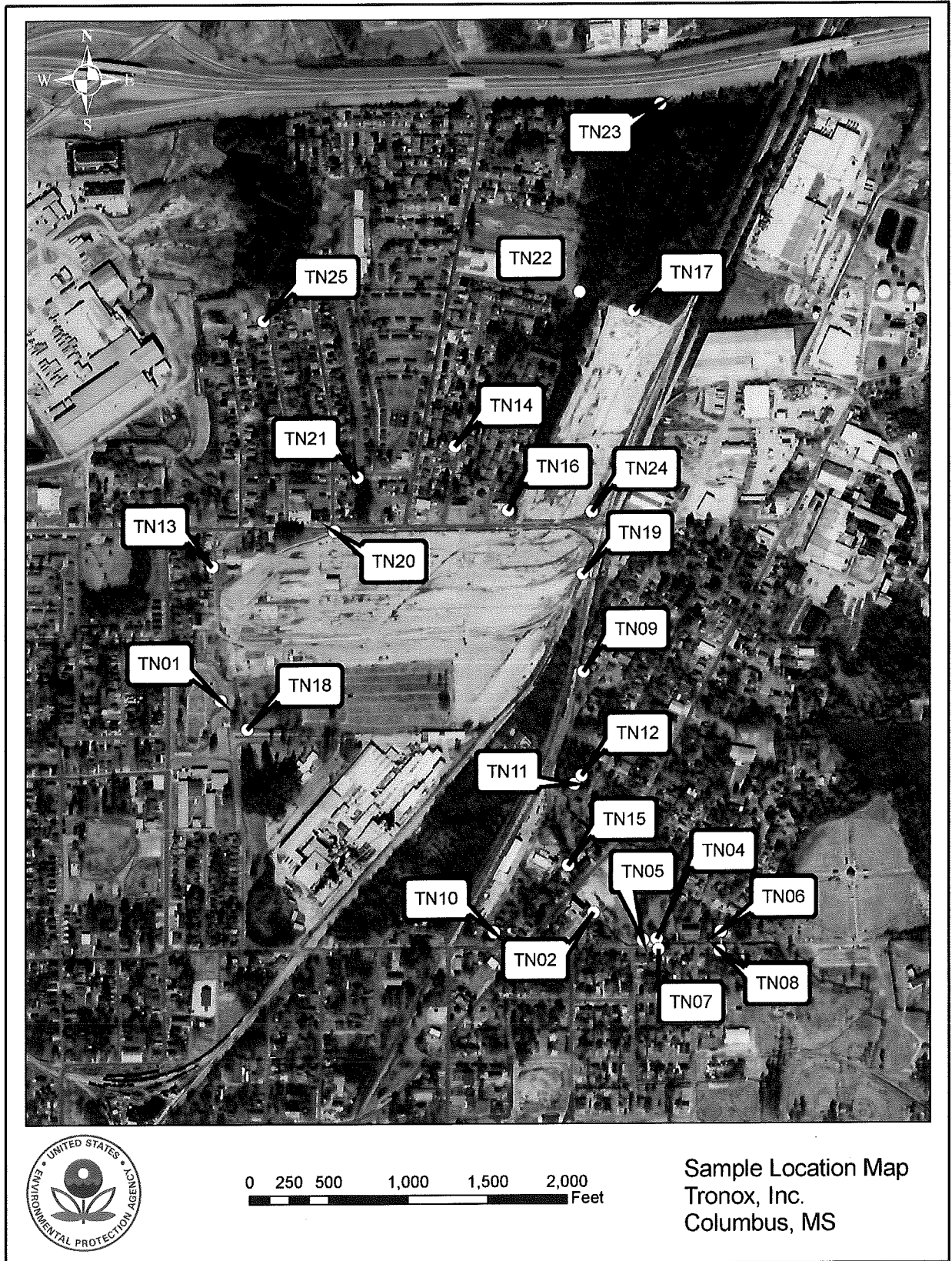
SUMMARY

A total of 6 semivolatile organic compounds (SVOCs) were detected above the Regional Screening Levels for Residential Soil (RSL). Eight samples exceeded the RSL for at least one analyte. The analytes which were detected above the RSL were benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthracene and indeno(1,2,3-cd)pyrene. Table 2 contains a summary of the samples and analytes which exceeded the RSL. No dioxin toxic equivalents (TEQs) were detected above the current OSWER residential action level of 1,000 parts per trillion.

Table 1**Location Data – Tronox Neighborhood Samples**

Sample ID	Station ID	Latitude	Longitude
TN01S	TN01	33.50777	-88.4101
TN02S, TN02W	TN02	33.50416	-88.4024
TN04S	TN04	33.50372	-88.4011
TN05S	TN05	33.5037	-88.4013
TN06S	TN06	33.50386	-88.3997
TN07S	TN07	33.50354	-88.401
TN08S	TN08	33.50353	-88.3997
TN09S, TN09SD	TN09	33.50834	-88.4026
TN10S	TN10	33.5038	-88.4044
TN11S	TN11	33.50639	-88.4028
TN12S	TN12	33.50653	-88.4027
TN13S, TN13W	TN13	33.51009	-88.4104
TN14S, TN14W	TN14	33.51222	-88.4054
TN15S	TN15	33.50498	-88.4029
TN16S	TN16	33.51111	-88.4042
TN17S	TN17	33.51461	-88.4017
TN18S	TN18	33.50727	-88.4096
TN19S	TN19	33.51004	-88.4027
TN20S	TN20	33.51072	-88.4078
TN21S	TN21	33.51166	-88.4074
TN22S	TN22	33.51492	-88.4028
TN23S	TN23	33.5182	-88.4012
TN24S	TN24	33.51112	-88.4025
TN25S	TN25	33.51436	-88.4094

Figure 1



SITE ACTIVITIES

The site investigation began on April 27, 2010 and concluded on April 28, 2010. A total of 24 stations were sampled. Ten ditch sediment samples were collected as grab samples. Fourteen composite (5 point) soil samples were collected. Three potable water samples were collected at stations TN2, TN13 and TN14. All samples were analyzed for semivolatile organic compounds and dioxins.

INVESTIGATION RESULTS

All samples were analyzed for semivolatile organic compounds using EPA Method 8270D. Dioxin analyses were conducted using the contract statement of work. Complete analytical data sheets are included in Appendix A of this report.

Table 3 summarizes the semivolatile organic compound analyses for soil and sediment. Twenty three semivolatile organic compounds were detected in one or more samples. Benzo(a)anthracene was detected above the RSL of 150 µg/kg in samples TN01S, TN02S, and TN09S at 810 µg/kg, 190 µg/kg and 1000 µg/kg, respectively. Benzo(a)pyrene was detected above the RSL of 15 µg/kg in samples TN01S, TN02S, TN04S, TN06S, TN09S, TN11S, TN12S, and TN13S ranging from 49 µg/kg to 1800 µg/kg. Benzo(b)fluoranthene was detected above the RSL of 150 µg/kg in samples TN01S, TN02S, TN04S, TN06S, TN09S, TN11S and TN13S ranging from 160 µg/kg to 4100 µg/kg. Benzo(k)fluoranthene was detected in sample TN09S at 1600 µg/kg, exceeding the RSL of 1500 µg/kg. Dibenzo(a,h)anthracene was detected above the RSL of 15 µg/kg in samples TN01S, TN02S, TN09S, and TN11S ranging from 45 µg/kg to 470 µg/kg. Indeno(1,2,3-cd)pyrene was detected above the RSL of 150 µg/kg in samples TN01S, TN02S, TN04S and TN09S ranging from 170 µg/kg to 1600 µg/kg.

Table 4 summarizes the dioxin analyses for soil and sediment. No analytes were detected above detection limits in the water samples TN02W, TN13W and TN14W.

QUALITY ASSURANCE

One duplicate sample, TN09SD, was collected in accordance with the data quality objectives of the investigation. Comparison of this sample with sample TN09S shows consistency of the analytes detected with some variability in the concentration, indicating slight variability in the contaminant dispersion.

METHODOLOGY

Field activities were conducted in accordance with SEDS's Management and Quality Systems Procedures and the following field measurement and sampling procedures.

SESDPROC-200-R1, Sediment Sampling
SESDPROC-305-R1, Potable Water Supply Sampling
SESDPROC-300-R1, Soil Sampling
SESDPROC-103-R2, Field Turbidity Measurement
SESDPROC-100-R2, Field pH Measurement
SESDPROC-110-R2, Global Positioning System
SESDPROC-101-R2, Field Specific Conductance Measurement

SESD Project ID Number: 10-0409

SESDPROC-102-R2, Field Temperature Measurement

All field measurement and sampling procedures were performed by SESD's Enforcement and Investigations Branch personnel.

Chain of Custody and documentation was prepared by Kevin Simmons.

Semivolatile organic samples were analyzed at the SESD laboratory in accordance with the Analytical Support Branch (ASB) Laboratory Operations and Quality Assurance Manual, January, 2010. The ASB laboratory is accredited by the National Environmental Laboratory Accreditation Program (NELAP).

Dioxin samples were analyzed at SGS Environmental Services, Wilmington, NC under the applicable contract statement of work.

Table 2
Semivolatile Regional Screening Level Comparison
Surface Soil and Sediment
Tronox, Inc.
Columbus, MS
April, 2010

Station iD Sample ID Sample Date				TN01 TN01S 4/27/10 14:20	TN02 TN02S 4/27/10 13:05	TN04 TN04S 4/28/10 8:50	TN06 TN06S 4/28/10 9:10
Analyte	Units	RSL RES SOIL	RSL Units				
Benzo(a)anthracene	ug/kg dry	150	ug/kg dry	810 J,O	190	<RSL	<RSL
Benzo(a)pyrene	ug/kg dry	15	ug/kg dry	830 J,O	230	100	140 J,O
Benzo(b)fluoranthene	ug/kg dry	150	ug/kg dry	1100 J,O	380	160	260 J,O
Benzo(k)fluoranthene	ug/kg dry	1500	ug/kg dry	<RSL	<RSL	<RSL	<RSL
Dibenzo(a,h)anthracene	ug/kg dry	15	ug/kg dry	220 J,O	79	<RSL	<RSL
Indeno (1,2,3-cd) pyrene	ug/kg dry	150	ug/kg dry	520 J,O	170	<RSL	<RSL

Station iD Sample ID Sample Date				TN09 TN09S 4/28/10 9:50	TN11 TN11S 4/28/10 10:10	TN12 TN12S 4/28/10 10:10	TN13 TN13S 4/27/10 13:35
Analyte	Units	RSL RES SOIL	RSL Units				
Benzo(a)anthracene	ug/kg dry	150	ug/kg dry	1000	<RSL	<RSL	<RSL
Benzo(a)pyrene	ug/kg dry	15	ug/kg dry	1800	180	49	130
Benzo(b)fluoranthene	ug/kg dry	150	ug/kg dry	4100	310	<RSL	230
Benzo(k)fluoranthene	ug/kg dry	1500	ug/kg dry	1600	<RSL	<RSL	<RSL
Dibenzo(a,h)anthracene	ug/kg dry	15	ug/kg dry	470	45	<RSL	<RSL
Indeno (1,2,3-cd) pyrene	ug/kg dry	150	ug/kg dry	1600	<RSL	<RSL	<RSL

Table 3
Semi-Volatile Organic Summary
Surface Soil and Sediment
Tronox, Inc.
Columbus, MS

Station ID Sample ID Sample Date		TN01 TN01S 4/27/10 14:20	TN02 TN02S 4/27/10 13:05	TN04 TN04S 4/28/10 8:50	TN05 TN05S 4/28/10 8:40	TN06 TN06S 4/28/10 9:10	TN07 TN07S 4/28/10 8:40	TN09 TN09S 4/28/10 9:50	TN09 TN09SD 4/28/10 9:51
Analyte	Units								
1-Methylnaphthalene	ug/kg dry	--	--	59	--	--	--	--	--
2,3,4,6-Tetrachlorophenol	ug/kg dry	--	--	--	--	--	--	--	--
2-Methylnaphthalene	ug/kg dry	--	--	50	--	--	--	49	--
Acenaphthene	ug/kg dry	--	--	--	--	--	--	--	--
Acenaphthylene	ug/kg dry	--	--	--	--	--	--	210	230 J,O
Anthracene	ug/kg dry	350 J,O	--	--	--	--	--	210	260 J,O
Benzaldehyde	ug/kg dry	--	--	130 J,O	56 J,O	--	--	52 J,O	--
Benzo(a)anthracene	ug/kg dry	810 J,O	190	69	--	--	--	1000	1600 J,O
Benzo(a)pyrene	ug/kg dry	830 J,O	230	100	--	140 J,O	--	1800	2600 J,O
Benzo(b)fluoranthene	ug/kg dry	1100 J,O	380	160	61	260 J,O	--	4100	4700 J,O
Benzo(g,h,i)perylene	ug/kg dry	530 J,O	140	58	--	--	--	1400	1700 J,O
Benzo(k)fluoranthene	ug/kg dry	920 J,O	200	96	43	200 J,O	--	1600	3300 J,O
Bis(2-ethylhexyl) phthalate	ug/kg dry	--	--	430	--	--	--	--	--
Carbazole	ug/kg dry	190 J,O	--	--	--	--	--	120	140 J,O
Chrysene	ug/kg dry	980 J,O	300	110	57	170 J,O	--	1500	2400 J,O
Dibenzo(a,h)anthracene	ug/kg dry	220 J,O	79	--	--	--	--	470	800 J,O
Dibenzofuran	ug/kg dry	--	--	--	--	--	--	59	--
Fluoranthene	ug/kg dry	1900 J,O	320	90	63	140 J,O	--	1300	1900 J,O
Indeno (1,2,3-cd) pyrene	ug/kg dry	520 J,O	170	63	--	--	--	1600	1900 J,O
Naphthalene	ug/kg dry	--	--	--	--	--	--	170	180 J,O
Pentachlorophenol	ug/kg dry	--	--	--	--	--	--	1500 J,O	1400 J,O
Phenanthrene	ug/kg dry	1500 J,O	89	84	--	--	--	220	270 J,O
Phenol	ug/kg dry	--	--	--	--	--	--	--	--
Pyrene	ug/kg dry	1700 J,O	340	110	77	170 J,O	44	2000	3200 J,O

Table 3 (continued)
Semi-Volatile Organic Summary
Surface Soil and Sediment
Tronox, Inc.

Station ID Sample ID Sample Date	Station ID Sample ID Sample Date	TN10 TN10S 4/28/10 9:10	TN11 TN11S 4/28/10 10:10	TN12 TN12S 4/28/10 10:10	TN13 TN13S 4/27/10 13:35	TN14 TN14S 4/27/10 10:15	TN15 TN15S 4/28/10 8:20	TN16 TN16S 4/27/10 11:25	TN17 TN17S 4/27/10 11:05
Analyte	Units								
2,3,4,6-Tetrachlorophenol	ug/kg dry	--	--	--	--	--	--	--	--
2-Methylnaphthalene	ug/kg dry	--	--	48	--	--	--	--	--
Acenaphthene	ug/kg dry	--	--	--	--	--	--	--	--
Acenaphthylene	ug/kg dry	--	--	--	--	--	70	780	390
Anthracene	ug/kg dry	--	--	--	--	--	140	470	590
Benzaldehyde	ug/kg dry	--	--	--	62 J,O	--	--	--	--
Benzo(a)anthracene	ug/kg dry	42	120	--	100	--	1600	6300	5000
Benzo(a)pyrene	ug/kg dry	--	180	49	130	--	1400	15000	6900
Benzo(b)fluoranthene	ug/kg dry	75	310	78	230	--	2900	24000	15000
Benzo(g,h,i)perylene	ug/kg dry	--	110	--	74	--	530	5300	4000
Benzo(k)fluoranthene	ug/kg dry	43	240	68	180	--	1700	11000	8900
Bis(2-ethylhexyl) phthalate	ug/kg dry	--	--	--	1100	--	--	--	--
Carbazole	ug/kg dry	--	--	--	--	--	55	--	560
Chrysene	ug/kg dry	70	210	79	160	--	2200	9500	11000
Dibenzo(a,h)anthracene	ug/kg dry	--	45	--	--	--	280	3100	2000
Dibenzofuran	ug/kg dry	--	--	--	--	--	61	--	--
Fluoranthene	ug/kg dry	73	240	78	120	--	3200	5000	12000
Indeno (1,2,3-cd) pyrene	ug/kg dry	--	130	--	85	--	660	7000	5100
Naphthalene	ug/kg dry	--	--	47	--	--	160	--	--
Pentachlorophenol	ug/kg dry	--	95 J,O	--	--	--	170 J,O	--	3000 J,O
Phenanthrene	ug/kg dry	--	49	51	44	--	390	330	1100
Phenol	ug/kg dry	--	--	--	--	230 J,O	--	--	--
Pyrene	ug/kg dry	72	360	110	160	--	3200	14000	17000

Table 3 (continued)

Semi-Volatile Organic Summary
 Surface Soil and Sediment
 Tronox, Inc.

Station ID Sample ID Sample Date		TN18 TN18S 4/27/10 14:10	TN19 TN19S 4/27/10 15:05	TN24 TN24S 4/27/10 14:50
Analyte	Units			
2,3,4,6-Tetrachlorophenol	ug/kg dry	96 J,O	--	370 J,O
2-Methylnaphthalene	ug/kg dry	--	--	350 J,O
Acenaphthene	ug/kg dry	--	--	230 J,O
Acenaphthylene	ug/kg dry	200	--	1300 J,O
Anthracene	ug/kg dry	270	71	1900 J,O
Benzaldehyde	ug/kg dry	--	--	--
Benzo(a)anthracene	ug/kg dry	950	630	11000 J,O
Benzo(a)pyrene	ug/kg dry	1600	790	24000 J,O
Benzo(b)fluoranthene	ug/kg dry	3300	1500	41000 J,O
Benzo(g,h,i)perylene	ug/kg dry	1300	490	15000 J,O
Benzo(k)fluoranthene	ug/kg dry	3000	980	33000 J,O
Bis(2-ethylhexyl) phthalate	ug/kg dry	--	--	--
Carbazole	ug/kg dry	160	--	900 J,O
Chrysene	ug/kg dry	1600	960	17000 J,O
Dibenzo(a,h)anthracene	ug/kg dry	500	200	5500 J,O
Dibenzofuran	ug/kg dry	75	--	480 J,O
Fluoranthene	ug/kg dry	1600	910	10000 J,O
Indeno (1,2,3-cd) pyrene	ug/kg dry	1500	600	15000 J,O
Naphthalene	ug/kg dry	210	71	1100 J,O
Pentachlorophenol	ug/kg dry	5500	190 J,O	12000 J,O
Phenanthrene	ug/kg dry	300	150	1700 J,O
Phenol	ug/kg dry	--	--	--
Pyrene	ug/kg dry	2700	1300	21000 J,O

Data Qualifiers

-- - analyte was not detected at or above the reporting limit

J - Identification of the analyte is acceptable; the reported value is an estimate.

O - Other qualifiers, see analytical data report

Table 4
Dioxin Summary
Surface Soil and Sediment
Tronox, Inc.

Station ID Sample ID		TN01 TN01S 4/27/10 14:20	TN02 TN02S 4/27/10 13:05	TN04 TN04S 4/28/10 8:50	TN05 TN05S 4/28/10 8:40	TN06 TN06S 4/28/10 9:10	TN07 TN07S 4/28/10 8:40
Sample Date/Time							
Analyte	Units						
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	ng/kg dry	2400	1600	240	160	270	160
1,2,3,4,6,7,8-Heptachlorodibenzofuran	ng/kg dry	1100	250	84	46	49	210
1,2,3,4,7,8,9-Heptachlorodibenzofuran	ng/kg dry	45	22	4.6 J,O	4.0 J,O	3.0 J,O	3.3 J,O
1,2,3,4,7,8-Hexachlorodibenzodioxin	ng/kg dry	22	4.6 J,O	2.5 J,O	1.7 J,O	2.1 J,O	1.6 J,O
1,2,3,4,7,8-Hexachlorodibenzofuran	ng/kg dry	83	41	7.7	7.9	4.2 J,O	4.6
1,2,3,6,7,8-Hexachlorodibenzodioxin	ng/kg dry	120	34	7.9	5.2	7.8	5.7
1,2,3,6,7,8-Hexachlorodibenzofuran	ng/kg dry	33	8.9	5.2	2.7 J,O	2.1 J,O	2.9 J,O
1,2,3,7,8,9-Hexachlorodibenzodioxin	ng/kg dry	70	10	5.5	3.7 J,O	4.3 J,O	3.9 J,O
1,2,3,7,8,9-Hexachlorodibenzofuran	ng/kg dry	10	7.8	1.4 J,O	--	0.97 J,O	0.99 J,O
1,2,3,7,8-Pentachlorodibenzodioxin	ng/kg dry	5.2	1.4 J,O	0.61 J,O	--	--	0.91 J,O
1,2,3,7,8-Pentachlorodibenzofuran	ng/kg dry	3.8 J,O	1.6 J,O	2.3 J,O	0.81 J,O	0.39 J,O	0.56 J,O
2,3,4,6,7,8-Hexachlorodibenzofuran	ng/kg dry	37	14	7.1	2.2 J,O	3.2 J,O	4.5
2,3,4,7,8-Pentachlorodibenzofuran	ng/kg dry	14	7.8	4.4 J,O	1.1 J,O	3.2 J,O	2.1 J,O
2,3,7,8-Tetrachlorodibenzodioxin	ng/kg dry	0.74 J,O	--	--	--	--	--
2,3,7,8-Tetrachlorodibenzofuran	ng/kg dry	1.5 O	--	2.7 O	--	0.79 J,O	--
Heptachlorodibenzodioxin (Total)	ng/kg dry	6300 J,O	6800 J,O	560 J,O	500 J,O	950 J,O	380 J,O
Heptachlorodibenzofuran (Total)	ng/kg dry	3300 J,O	1400 J,O	260 J,O	140 J,O	200 J,O	420 J,O
Hexachlorodibenzodioxin (Total)	ng/kg dry	1100 J,O	310 J,O	66 J,O	53 J,O	84 J,O	47 J,O
Hexachlorodibenzofuran (Total)	ng/kg dry	890 J,O	410 J,O	95 J,O	54 J,O	70 J,O	100 J,O
Octachlorodibenzodioxin	ng/kg dry	22000	28000 J,O	2400	2400	3700 J,O	3000
Octachlorodibenzofuran	ng/kg dry	1700	960	220	100	170	180
Pentachlorodibenzodioxin (Total)	ng/kg dry	140 J,O	19 J,O	16 J,O	9.2 J,O	12 J,O	9.0 J,O
Pentachlorodibenzofuran (Total)	ng/kg dry	120 J,O	40 J,O	36 J,O	34 J,O	27 J,O	21 J,O
TEQ (Avian Toxic. Equiv. Value, WHO TEQ-98)	ng/kg dry	64	26 J,O	13 J,O	5.8 J,O	8.1 J,O	8.3 J,O
TEQ (Fish Toxic. Equiv. Value, WHO TEQ-98)	ng/kg dry	59	23 J,O	8.5 J,O	5.1 J,O	6.3 J,O	7.0 J,O
TEQ (Mammalian Toxic. Equiv. Value, WHO TEQ-2005)	ng/kg dry	90	43 J,O	11 J,O	7.0 J,O	9.2 J,O	8.9 J,O
Tetrachlorodibenzodioxin (Total)	ng/kg dry	14 J,O	2.7 J,O	6.6 J,O	1.7 J,O	2.5 J,O	2.4 J,O
Tetrachlorodibenzofuran (Total)	ng/kg dry	18 J,O	2.9 J,O	26 J,O	7.9 J,O	7.8 J,O	6.3 J,O

Table 4 (continued)
Dioxin Summary
Surface Soil and Sediment
Tronox, Inc.

Station ID Sample ID Sample Date/Time	Station ID Sample ID Sample Date	TN08 TN08S 4/28/10 9:05	TN09 TN09S 4/28/10 9:50	TN09 TN09SD 4/28/10 9:51	TN10 TN10S 4/28/10 9:10	TN11 TN11S 4/28/10 10:10	TN12 TN12S 4/28/10 10:10
Analyte	Units						
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	ng/kg dry	120	21000	27000	810	9000	1800
1,2,3,4,6,7,8-Heptachlorodibenzofuran	ng/kg dry	30	6200	6000	210	2000	380
1,2,3,4,7,8,9-Heptachlorodibenzofuran	ng/kg dry	1.5 J,O	710	560	15	180	26
1,2,3,4,7,8-Hexachlorodibenzodioxin	ng/kg dry	1.3 J,O	81	65	6.4	32	8.0
1,2,3,4,7,8-Hexachlorodibenzofuran	ng/kg dry	1.8 J,O	1400	950	25	290	38
1,2,3,6,7,8-Hexachlorodibenzodioxin	ng/kg dry	4.3 J,O	950	840	27	260	40
1,2,3,6,7,8-Hexachlorodibenzofuran	ng/kg dry	1.2 J,O	390	240	17	71	10
1,2,3,7,8,9-Hexachlorodibenzodioxin	ng/kg dry	3.2 J,O	190	150	15	71	16
1,2,3,7,8,9-Hexachlorodibenzofuran	ng/kg dry	0.30 J,O	290	230	6.8	52	6.5
1,2,3,7,8-Pentachlorodibenzodioxin	ng/kg dry	0.86 J,O	--	--	3.7 J,O	9.2	--
1,2,3,7,8-Pentachlorodibenzofuran	ng/kg dry	--	0.20 J,O	73	2.3 J,O	9.4	1.6 J,O
2,3,4,6,7,8-Hexachlorodibenzofuran	ng/kg dry	1.6 J,O	650	370	37	110	16
2,3,4,7,8-Pentachlorodibenzofuran	ng/kg dry	0.76 J,O	0.20 J,O	260	74	73	6.9
2,3,7,8-Tetrachlorodibenzodioxin	ng/kg dry	--	4.2 J,O	1.6 J,O	--	0.55 J,O	--
2,3,7,8-Tetrachlorodibenzofuran	ng/kg dry	--	40 O	18 O	1.6 O	1.8 O	1.4 O
Heptachlorodibenzodioxin (Total)	ng/kg dry	320 J,O	62000 J,O	83000 J,O	1800 J,O	26000 J,O	5000 J,O
Heptachlorodibenzofuran (Total)	ng/kg dry	90 J,O	36000 J,O	37000 J,O	820 J,O	11000 J,O	410 J,O
Hexachlorodibenzodioxin (Total)	ng/kg dry	42 J,O	5900 J,O	4800 J,O	210 J,O	1600 J,O	320 J,O
Hexachlorodibenzofuran (Total)	ng/kg dry	31 J,O	14000 J,O	11000 J,O	580 J,O	3300 J,O	450 J,O
Octachlorodibenzodioxin	ng/kg dry	1600	150000 J,O	280000 J,O	8600 J,O	97000 J,O	24000 J,O
Octachlorodibenzofuran	ng/kg dry	58	17000	22000	650	6100	1800
Pentachlorodibenzodioxin (Total)	ng/kg dry	7.7 J,O	690 J,O	240 J,O	39 J,O	100 J,O	30 J,O
Pentachlorodibenzofuran (Total)	ng/kg dry	8.2 J,O	450 J,O	1400 J,O	440 J,O	470 J,O	48 J,O
TEQ (Avian Toxic. Equiv. Value, WHO TEQ-98)	ng/kg dry	3.9 J,O	480 J,O	640 J,O	95 J,O	190 J,O	29 J,O
TEQ (Fish Toxic. Equiv. Value, WHO TEQ-98)	ng/kg dry	3.2 J,O	460 J,O	500 J,O	58 J,O	160 J,O	27 J,O
TEQ (Mammalian Toxic. Equiv. Value, WHO TEQ-2005)	ng/kg dry	4.6 J,O	760 J,O	820 J,O	54 J,O	260 J,O	48 J,O
Tetrachlorodibenzodioxin (Total)	ng/kg dry	1.6 J,O	190 J,O	46 J,O	9.0 J,O	12 J,O	6.0 J,O
Tetrachlorodibenzofuran (Total)	ng/kg dry	3.2 J,O	980 J,O	280 J,O	87 J,O	53 J,O	12 J,O

Table 4 (continued)
Dioxin Summary
Surface Soil and Sediment
Tronox, Inc.

Station ID Sample ID Sample Date/Time	Station ID Sample ID Sample Date	TN13 TN13S 4/27/10 13:35	TN14 TN14S 4/27/10 10:15	TN25 TN25S 4/27/10 9:45
Analyte	Units			
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	ng/kg dry	1300	140	39
1,2,3,4,6,7,8-Heptachlorodibenzofuran	ng/kg dry	260	26	4.5 J,O
1,2,3,4,7,8,9-Heptachlorodibenzofuran	ng/kg dry	14	1.6 J,O	--
1,2,3,4,7,8-Hexachlorodibenzodioxin	ng/kg dry	9.4	1.4 J,O	0.59 J,O
1,2,3,4,7,8-Hexachlorodibenzofuran	ng/kg dry	19	2.1 J,O	0.51 J,O
1,2,3,6,7,8-Hexachlorodibenzodioxin	ng/kg dry	34	4.0 J,O	1.1 J,O
1,2,3,6,7,8-Hexachlorodibenzofuran	ng/kg dry	8.4	0.96 J,O	0.33 J,O
1,2,3,7,8,9-Hexachlorodibenzodioxin	ng/kg dry	21	--	1.0 J,O
1,2,3,7,8,9-Hexachlorodibenzofuran	ng/kg dry	3.4 J,O	0.36 J,O	0.16 J,O
1,2,3,7,8-Pentachlorodibenzodioxin	ng/kg dry	4.0 J,O	--	0.56 J,O
1,2,3,7,8-Pentachlorodibenzofuran	ng/kg dry	2.0 J,O	0.51 J,O	--
2,3,4,6,7,8-Hexachlorodibenzofuran	ng/kg dry	11	1.3 J,O	0.41 J,O
2,3,4,7,8-Pentachlorodibenzofuran	ng/kg dry	5.7	0.73 J,O	0.31 J,O
2,3,7,8-Tetrachlorodibenzodioxin	ng/kg dry	0.65 J,O	--	--
2,3,7,8-Tetrachlorodibenzofuran	ng/kg dry	1.6 O	--	--
Heptachlorodibenzodioxin (Total)	ng/kg dry	3400 J,O	510 J,O	110 J,O
Heptachlorodibenzofuran (Total)	ng/kg dry	990 J,O	97 J,O	14 J,O
Hexachlorodibenzodioxin (Total)	ng/kg dry	340 J,O	46 J,O	16 J,O
Hexachlorodibenzofuran (Total)	ng/kg dry	260 J,O	27 J,O	5.9 J,O
Octachlorodibenzodioxin	ng/kg dry	14000 J,O	2000	1600
Octachlorodibenzofuran	ng/kg dry	770	81	12
Pentachlorodibenzodioxin (Total)	ng/kg dry	55 J,O	7.0 J,O	6.0 J,O
Pentachlorodibenzofuran (Total)	ng/kg dry	48 J,O	5.7 J,O	2.6 J,O
TEQ (Avian Toxic. Equiv. Value, WHO TEQ-98)	ng/kg dry	25 J,O	3.8 J,O	2.3 J,O
TEQ (Fish Toxic. Equiv. Value, WHO TEQ-98)	ng/kg dry	23 J,O	3.3 J,O	1.7 J,O
TEQ (Mammalian Toxic. Equiv. Value, WHO TEQ-2005)	ng/kg dry	37 J,O	4.9 J,O	2.3 J,O
Tetrachlorodibenzodioxin (Total)	ng/kg dry	16 J,O	0.37 J,O	1.8 J,O
Tetrachlorodibenzofuran (Total)	ng/kg dry	24 J,O	2.4 J,O	2.7 J,O

Data Qualifiers

-- - analyte was not detected at or above the reporting limit

J - Identification of the analyte is acceptable; the reported value is an estimate.

O - Other qualifiers, see analytical data report